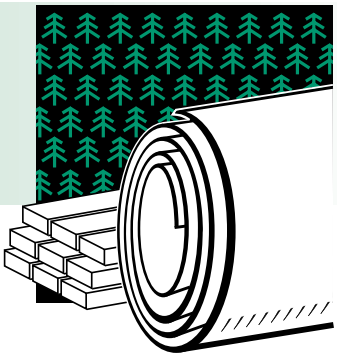
FOREST PRODUCTS

Project Fact Sheet



Replacing Chemicals in Recycle Mills with Mechanical Alternatives

Benefits

- Provides projected energy savings of more than 1 billion kWh/yr
- Reduces recycle mill operation costs
- Potentially replaces use of expensive, stickies-control chemicals

Applications

Present commercial applications of this technology include the detonation of land mines, zebra mussel control, and water disinfection. Investigators are hopeful that this technology will have further applications from recycle to virgin mills. Potential uses include fiber refining, disinfection, stickies dispersion, and stickies control.

Both the vendor and two recycling mills will be directly involved in this project. This will facilitate the transfer of the technology when it is ready for commercialization.

Mechanical Shock Waves Will Be Substituted for Chemicals in Pulp and Paper Recycling Operations

Stickies cause considerable downtime in mills utilizing secondary fiber, and several million dollars' worth of minerals and polymers are added for handling and detackifying stickies during processing.

A promising method for achieving the same result through mechanical means is the use of pulsed power, a technology that delivers a shock wave to the pulp slurry underwater. Researchers at IPST have found that sparking improved the screenablility of stickies in the presence of pulp. Energetic chemical species such as the hydroxyl radical are generated by the shock wave and used to oxidize the stickies.

Shock Waves for Stickies-Control

Figure 1. The photograph shows the effect of the shock wave on air bubbles in water.

Project Description

Goal: To study the feasibility and economics of applying pulsed power technology to the pulp and paper industry through two initial applications.

When a spark is discharged under water, it creates a plasma, which sets up a shock wave that also generates reactive hydroxyl radicals by splitting water. The shock wave can potentially be used to disperse stickies, and the radicals are able to oxidize stickies to the extent that they lose their tack and become benign.

The two objectives to this research in the forest products industry are as follows:

(1) **Dispersion of stickies in whitewater systems.** Researchers will induce agglomeration of stickies and measure its rate, using two model stickies: a hot melt (polyvinyl acetate) and a pressure-sensitive adhesive (acrylate). The pulser should prevent agglomeration and break up agglomerated stickies, unlike chemicals, which only accomplish one or the other operation.

(2) **Detackification of stickies**. Studies will examine the potential detackification of stickies through energetic chemical species created by the shock wave. Shock waves will be applied, and the detackification of stickies examined as a function of pulse energy and other parameters. Stickie suspensions in water and in pulp slurries will also be examined to determine the pulse level required for optimum detackification.

The laboratory-scale work of this two-year project will be conducted at the Institute of Paper Science and Technology, while the field work will be carried out at commercial mills.

Progress & Milestones

- A full-scale trial, run for five weeks in April/May 2000 at Visy Paper, Conyers, GA, showed that a single sparker unit placed in the stuff box was able to reduce stickie deposition on the dryer felts.
- Preliminary research indicates that both sonication and sparking create hydroxyl radicals. Since both processes also detackify stickies, it is likely that hydroxyl radicals are responsible for the detackification
- A patent application has been filed.
- A sparker unit was purchased and installed at IPST.
- A licensing agreement with Spartec Environmental, Ontario, Canada, the manufacturer of the device has been negotiated.
- An ongoing mill trial at Augusta Newsprint showed that the sparker removes solid material from clarified whitewater.
- Sparking removed sulfide from water, possibly through oxidation, indicating its potential in odor control.
- Full scale trial will be continued at Augusta Newsprint and Visy Paper.

Project Partners

Sparktec Environmental
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Visy Paper, Inc
Conyers, GA

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